

The effect of feedstock treatment on the deasphalting process

Goncharova I., Safiulina A., Khusnutdinov I., Alawode E., Skvortsova G.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2018, © 2018 Taylor & Francis Group, LLC. Transportation and further processing techniques of natural bitumen are of high demand nowadays. In the present article, deasphalting of bitumen with low-molecular oxygen containing solvents was proposed. A method for regulating the process of deasphalting aimed at increasing the yield of low-viscosity deasphalted oil was developed. The influence of the depth of distillation and solvent: feed ratio on the yield of the products of deasphalting was revealed. A study on various technological options for the primary processing of natural bitumen and ultra-high-viscosity oils for pipeline transport was conducted.

<http://dx.doi.org/10.1080/10916466.2018.1482320>

Keywords

acetone, bitumen, deasphalted oil, deasphalting, pipeline transport, solvent

References

- [1] Al-Sabawi, M., D., Seth, and T., de Bruijn. 2011. Effect of modifiers in N-pentane on the supercritical extraction of athabasca bitumen. *Fuel Processing Technology* 92 (10): 1929–38. doi:10.1016/J.FUPROC.2011.05.010.
- [2] Das, S. K., and R. M., Butler. 1998. Mechanism of the vapor extraction process for heavy oil and bitumen. *Journal of Petroleum Science and Engineering* 21: 43–59. doi:10.1016/S0920-4105(98)00002-3.
- [3] Hein, F. J. 2017. Geology of bitumen and heavy oil: An overview. *Journal of Petroleum Science and Engineering* 154: 551–63. doi:10.1016/J.PETROL.2016.11.025.
- [4] Höucker, J., and A., Vogelpohl. 1987. Continuous deasphalting of heavy petroleum residues with ethyl acetate. *Chemical Engineering & Technology-CET* 10: 125–31. doi:10.1002/ceat.270100116.
- [5] Im, S. I., S., Shin, J., Woo Park, H., Jin Yoon, K., Seok Go, N., Sun Nho, and K., Bong Lee. 2018. Selective separation of solvent from deasphalted oil using CO₂ for heavy oil upgrading process based on solvent deasphalting. *Chemical Engineering Journal* 331: 389–94. doi:10.1016/J.CEJ.2017.08.094.
- [6] Kan, T., H., Wang, C., Li, and S., Zhang. 2015. Liquid fuels from ethylene tar by two-stage catalytic hydroprocessing. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* 37: 2317–22. doi:10.1080/15567036.2011.613892.
- [7] Kapadia, P. R., M. S., Kallos, and I. D., Gates. 2015. A review of pyrolysis, aquathermolysis, and oxidation of athabasca bitumen. *Fuel Processing Technology* 131: 270–89. doi:10.1016/J.FUPROC.2014.11.027.
- [8] Kazakova, L. P., and S. E., Crane. 1978. *Physico-chemical basis for production of oils*. Moscow, Russia: Khimiya.
- [9] Khusnutdinov, I. S., A. G., Safiulina, R. R., Zabbarov, O. A., Dubovikov, S. I., Khusnutdinov, and N. K., Khaldarov. 2017. Influence of physicochemical properties of highly organized oil disperse systems on efficiency of thermomechanical dehydration. *Chemistry and Technology of Fuels and Oils* 52: 779–84. doi:10.1007/s10553-017-0773-y.

- [10] Khusnutdinov, I. S., A. G., Safiulina, R. R., Zabbarov, S. I., Khusnutdinov, and A. I., Gaffarov. 2014. Method of dehydration of highly-stable water-hydrocarbon emulsions of natural and technogenic origins. Russian Patent 2581584, filed December 30, 2014, and issued April 20, 2016.
- [11] Klerk, A. D., M. R., Gray, and N., Zerpa. 2014. Unconventional oil and gas. In *Future energy*, 95–116. Elsevier Science Publishing Co Inc.: United States. doi:10.1016/B978-0-08-099424-6.00005-3.
- [12] La, H., and S. E., Guigard. 2015. Extraction of hydrocarbons from athabasca oil sand slurry using supercritical carbon dioxide. *The Journal of Supercritical Fluids* 100: 146–54. doi:10.1016/J.SUPFLU.2015.01.020.
- [13] Leyva-Gomez, H., and T., Babadagli. 2018. Efficiency of heavy-oil/bitumen recovery from fractured carbonates by hot-solvent injection. *Journal of Petroleum Science and Engineering* 165: 752–64. doi:10.1016/J.PETROL.2018.03.004.
- [14] Li, X., Y., Du, G., Wu, Z., Li, H., Li, and H., Sui. 2012. Solvent extraction for heavy crude oil removal from contaminated soils. *Chemosphere* 88: 245–9. doi:10.1016/J.CHEMOSPHERE.2012.03.021.
- [15] Nimana, B., C., Canter, and A., Kumar. 2015. Energy consumption and greenhouse gas emissions in the recovery and extraction of crude bitumen from canada's oil sands. *Applied Energy* 143: 189–99. doi:10.1016/J.APENERGY.2015.01.024.
- [16] Patwardhan, S. R. 1977. Fractionation of petroleum bitumens. *Fuel* 56: 40–4. doi:10.1016/0016-2361(77)9003-4.
- [17] Speight, J. G. 2013a. Refining heavy oil and extra-heavy oil. In *Heavy and extra-heavy oil upgrading technologies*, 1–13. Gulf Professional Publishing: USA. doi:10.1016/B978-0-12-404570-5.00001-6.
- [18] Speight, J. G. 2013b. Upgrading during recovery. In *Oil sand and tar production processes*, 139–53. Gulf Professional Publishing: USA. doi:10.1016/B978-0-12-404572-9.00006-1.
- [19] Speight, J. G. 2016. Nonthermal methods of recovery. In *Introduction to enhanced recovery methods for heavy oil and tar sands*, 353–403. Gulf Professional Publishing: USA. doi:10.1016/B978-0-12-849906-1.00008-4.
- [20] Verma, A., B., Nimana, B., Olateju, M. M., Rahman, S., Radpour, C., Canter, V., Subramanyam, D., Paramashivan, M., Vaezi, and A., Kumar. 2017. A techno-economic assessment of bitumen and synthetic crude oil transport (SCO) in the Canadian oil sands industry: Oil via rail or pipeline? *Energy* 124: 665–83. doi:10.1016/J.ENERGY.2017.02.057.
- [21] Zou, C. 2017. Heavy oil and bitumen. In *Unconventional petroleum geology*, 345–70. Elsevier Science Publishing Co Inc.: United States. doi:10.1016/B978-0-12-812234-1.00012-1.